

Computer System of Control of the Treatment Process for the Patients with Closed Fractures of Long Bones

**Stella V. Gyulnazarova, M.D., Victor I. Mamaev, M.D., Leonid A. Kazak, M.D.,
Urals Institute of Traumatology and Orthopaedy,
Saveliy I. Goldberg, PH.D., Institute of Physiology,
Ekaterina A. Fedorova, Urals State University,
Ekaterinburg, RUSSIA**

The problem of adequate treatment of the patient with closed fractures of the long tubular bones is meanwhile an important social and medical problem. In some cases the cause of failures is the insufficient qualification of a physician. It is especially typical for Russia with its vast land spaces, where treatment of bone fractures sometimes is provided by a physician who is not qualified as traumatologist. In this connection, there was created the computer system of control and assessment of treatment course.

The central point of the system is the stage-to-stage prognosing of the treatment results: the initial prognosis, immediately after the specialized aid (operation, closed reduction), in a week and a month after beginning of the treatment and long-term prognosis for the following stages of the treatment. For each stage, the system uses an original decision support system and gives a conclusion about treatment course. If there is a trouble prognosis it proposes correction methods, recommendations for complicated cases and forbidding medical steps. The system can assess the result of any treatment and in trouble outcome it analyses the causes of failure. Account of recommendations is from 6 to 20 at various stage. The number of signs which help to estimate the patients state and give a conclusion concerning the

treatment course is about 113; 11 of them are considered in dynamics. In every stage the physician can print the information about patient, prognosis and recommendations.

The system is written in Turbo-Prolog 2.0 for IBM-compatible personal computer and has user-friendly interface. Conclusions and recommendations of the system were constructed by means production rules traditionally for expert systems. For prognosing the system adds points of informative signs for each prognosis and compares the sum with threshold values for good, satisfactory and unfavourable outcome. The threshold values were obtained from solving of discriminant analysis problem for Urals Institute patients. The points were set by an expert way at the beginning of the system development and they were changed with help of linear correction method in the process of additional learning.

At present the system is beta-testing at the Urals Institute of Traumatology and Orthopaedy in Ekaterinburg and in the town hospital in Pyshma (the Ural Region).

The system has the further development potential and can be tuned for another area of traumatology just by replacement its knowledge base.